

# **The Integration of Assistive Technology into Standard Classroom Practices:**

## **Practical Recommendations for K-12 General Educators**

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### **Abstract**

*Recommendations regarding viable methods of integrating assistive technology into K-12 educational environments are becoming increasingly relevant to general educators, special educators, paraprofessionals and administrators alike who, with rising frequency, encounter and have sustained interactions with students who have disabilities and are using assistive technology. To facilitate the graceful integration of assistive technology into classroom practices, educators must become involved in the various trainings on assistive technology devices from numerous sources such as the Internet; attending face-to-face training sessions; or through each state's Parent Training and Information Center, which may be individually located at <http://www.peatc.org>. Assistive technology has a tremendous amount of unrealized potential for enhancing the learning of students with disabilities and those without. In order to realize that potential, however, there must first be awareness, understanding and implementation on the part of the educator and assistive technology user that optimize student learning and remain compliant with federal guidelines.*

Keywords: Assistive technology, disabilities, integration

A significant outcome of the age of inclusion is that general educators with little or no formal instruction and/or prior professional experience with assistive technologies are receiving swift, informal on-the-job training in the use of these aids as assistive technologies become increasingly available to all students with special needs. Consequently, general education teachers continuously receive steady influxes of students with Individualized Education programs (IEP) outlining requirements for assistive devices which effectively normalize students' functions and improve their quality of life within the school setting.

So the question becomes what is assistive technology; which students need assistive technology; and how can it be effectively used in daily classroom practices to enhance student learning? According to the Assistive Technology Act of 1998, assistive technology refers to "any item, piece of equipment, or product that is used to increase, maintain, or improve functional capabilities of individuals with disabilities" (Assistive Technology Act, 1998). Additionally, the broad term assistive technology is used to describe a variety of devices and services that help ensure that students with disabilities are included in a full range of social experiences and are able to function more independently, thus improving their quality of life (Batshaw, 2002). Assistive technology consists of tools that enhance the functional capabilities of persons with disabilities and are defined in Individuals with Disabilities Education Act (IDEA) of 1997 (i.e., Public Law 105-17) as "any item, piece of equipment, or product used to increase, maintain, or improve functional capabilities." In the Individuals with Disabilities Education Improvement Act of 2004 (i.e., Public Law 108-446), the definition of assistive technology is amended to exclude "[a] surgically implanted medical device or replacement of such device" (Mandlawitz, 2006).

Assistive technology devices encompass a vast spectrum of apparatus and are far more common than many realize. Within a twenty-four hour period, for example, most people use numerous forms of assistive technology in daily life, including the following (Edyburn, 2003):

- Wearing glasses or contacts
- Watching television with closed captioning
- Using a remote to open/close a garage door
- Phoning someone using speed-dial
- Pre-setting coffee makers for an early morning cup of coffee
- Using the Internet to search for information.

Within the context of the general education classroom, assistive technology encompasses fairly common as well as rare, sophisticated devices implemented to provide students with multiple, effective means to successfully complete their work. In terms of positioning, for example, equipment used includes side lying frames, walkers, chair inserts, standing aids and beanbag chairs. To complete class and homework, certain students require devices that provide access to computers or environmental controls, such as special switches, expanded keyboards, head pointers and key guards. Independent use of equipment in the classroom is also a possibility for students with physical disabilities through environmental controls such as remote controls and special adaptations of on/off switches to make them accessible. Students who are nonverbal or whose speech is too disfluent to communicate effectively benefit from a wide variety of communication devices. As listening is key to a successful classroom experience, assistive devices for hearing such as hearing aids, personal FM units, or closed-captioned TV are essential for students with auditory disabilities. Special listening systems can help a student with hearing loss “tune in” to the teacher’s voice from afar. Of course, another major learning mode is visual. Technology can be implemented to help with visually impaired students by increasing contrast, enlarging stimuli and making use of tactile and auditory modes, these devices include screen readers, screen enlargers, magnifiers, taped books, Brailers, light boxes, and scanners. Students with mobility impairments require devices such as wheelchairs, self-propelled walkers, or recreational vehicles like bikes or scooters. In terms of recreation, which is a crucial component

of school life because it promotes interaction between all students, adapted recreational aids are quite helpful. Recreational aids include drawing software, computer games, computer simulations, adapted puzzles, balls that beep for students with visual impairments and cuffs to help grasp paddles or racquets. In general education health and hygiene courses, self-care aids (e.g., electric feeders, adapted toilet seats, aids for tooth brushing, washing, dressing and grooming) can be critical in enabling a student function without an attendant at school (GENASYS, 2002; Jendron, 2008).

With the myriad options available to all public school educators, it is important to note that, legally, assistive technology devices are defined (§ 300.5) as “any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of a child with a disability (Authority: 20 U.S.C. 1401 (1)). Practically, assistive technology devices are typically divided into two general categories: high tech (highly sophisticated systems) and low tech (informal teacher-made devices). Low-tech assistive technology devices include such teacher-made items as a pencil gripper, whereas high-tech assistive technology consists of more expensive devices such as communication boards and word recognition equipment. Other more familiar high-tech assistive technology devices are items such as the wheelchair a student uses for mobility; an electronic communication board for a student who is nonverbal and needs augmentative-alternative devices in order to communicate their needs and desires with others; a hearing aid or a sign-language interpreter; and large print text or Braille for a student who has a visual impairment. Assistive technology provides invaluable assistance in helping students with disabilities achieve independence while meeting their academic and social goals.

Additionally, assistive technology devices offer countless opportunities for individuals without significant disabilities to actively participate in the daily life experiences that those without disabilities have long enjoyed. While assistive technology provides individuals with

significant disabilities a chance for active participation and self-advocacy in a variety of academic and social milieus, assistive technology also aids students who are typically developing and do not have any type of disability. To create an environment which promotes optimal student learning, facilitate the inclusion of assistive technology as well as assistive technology users in general education environments and remain compliant with the federal mandates of IDEA, classroom teachers need to go beyond a hastily-acquired, perfunctory awareness of the existence of assistive technology. They must become intimately familiar with the various types of assistive technologies that are available to students of varying abilities.

### **Benefits of Assistive Technology**

Among the numerous benefits of assistive technology, arguably the greatest is the ability of assistive technology to increase student-users' sense of personal independence and degree of access to the general education curriculum and environment. Through these fundamental forms of inclusion, students are able to engage in activities with their typically-developing peers as well as their peers with disabilities and are granted autonomy, as they possess a sense of control over decision-making processes in their lives and opportunities for expanded life experiences. When students are actively involved with their peers it increases their self-esteem. Further, research supports the concept that self-esteem is directly related to achievement; therefore increasing desirable, productive interactions with overall school-community will lead to a significant improvement in academic performance. This effective use of assistive technology can be critical in prompting a student to overcome the academic and social barriers in their lives. As illustrated in the case study excerpt featuring a third-grade student with a disability in a general education class below, assistive technology can be a powerful tool for securing independence and guaranteeing inclusion in the general education classroom:

Timothy was a third grader in a general education class. Prior to the referral to the assistive technology team, he was using a

communication device and was taking Accelerated Reading Tests on the classroom computer. He has great difficulty using pencil and paper, so his shadow (paraprofessional) was interpreting his answers and putting them on paper for him. His Occupational Therapist and parent were interested in seeing him become more independent with his classroom work. Their request included assistance in finding software that would allow the teacher to scan worksheets into the computer, so Timothy could work on the same assignments as his peers. (<http://www.sc.edu/scatp/cdrom/integratingat.htm>)

This “software” which permitted Timothy to use his augmentative communication device to inform his class which grammar rule he was using to determine how to correct a sentence qualifies as assistive technology. With the aid of a computer program, Timothy was granted a great deal of autonomy and actively recast himself into a more desirable subject position as a co-learner with the classroom. Through the use of assistive technology Timothy, and others like him, can complete work independently as the computer scans sheets; remove a degree of separation between themselves and their peers by eliminating the necessity of using a paraprofessional to transcribe responses; as well as remain abreast of and engaged with the same curriculum at roughly the same as pace as their peers without disability, thereby more fully integrating Timothy into the culture of the classroom and establishing this assistive technology user as a self-reliant, intellectually adept colleague rather than a conspicuous, semi-isolated learner with disability.

As in the case of Timothy and other similarly positioned learners with disabilities, assistive technology has the unprecedented potential to aid students by providing multiple, varied means to focus on, master and complete the work required in a general education classroom. For example, assistive technology presents the material in different forms (visually, auditorily, etc.)

which facilitates the mastery of grade-level content as well as the acquisition of foundational conceptual information upon which future learning may be predicated. Further, assistive technology may either read texts digitally or initially present them at a lower grade level for students with disabilities, thereby permitting them to “read” grade-level texts. This also lends itself to academic language and literacy development, as certain students with disabilities may now be reasonably encouraged and expected to write and speak using their newly-acquired grade-level vocabulary words without concern for poor spelling skills, a task would have been nearly impossible to attempt without a computer. Additionally, assistive technology enables students with disabilities to improve their writing and organizational skills through such activities as developing concept maps for research papers and take notes, a task which has traditionally proven difficult for numerous students with disabilities who have difficulty taking notes in longhand because of poor spelling, writing, and/or eye-hand coordination skills. With the aid of such devices, students can both experience and master abstract educational concepts which would have been considered beyond their grasp in previous eras while diminishing academic fatigue and ennui (Jendron, 2008; Reed, 2001). Further, any student who is fully included and engaged usually provides less of a distraction to other students.

### **Determining Who Needs Assistive Technology and Selecting the Device**

The need for assistive technology is often demonstrated through repeated difficulties or failure to complete a task (Edyburn, 2003). King (1999) identifies two responses to inadequate performance: remediation and compensation. Remediation is identified as providing additional instruction, training or coaching to help a person improve their performance. If the instruction fails to help a person perform the tasks effectively, then compensatory approaches must be considered (Edyburn, 2003). Specifically, compensation focuses on using technology or other strategies to accommodate any difficulties the student has performing the task. This can be accomplished, for example, by giving a student a calculator to use in math after reaching

multiple failures during their math performance. Whenever a performance problem has been identified, assistive technology should be considered.

Upon identifying a performance problem, the general educator should work collaboratively with a special educator, who has greater expertise in assistive technology, to identify the appropriate device(s). Typically, general educators are not individually tasked with identifying suitable assistive technology devices for use with a student alone; however, being familiar with what is available will inform and facilitate recommendations of devices that will directly address the deficits and needs of the student as they are observed and documented. Certainly, assistive technologies may often be placed in traditional categories including Assistive Technology for Vision (i.e., aids for students who are blind or have low vision); Assistive Technology for Communication (i.e., aids for students who have difficulty in communicating who are deemed unintelligible, have no or very little verbal skills, or have limited language proficiency); Assistive Technology for Access (i.e., aids for students who have difficulties in accessing communication, learning tools, or engaging in classroom or home activities); Assistive Technology for Hearing (i.e., aids for students who are deaf or hard-of-hearing); and Assistive Technology for Learning and Studying (i.e., aids for students with high-incidence disabilities--learning, behavior, or cognitive disabilities--to increase, maintain, or improve their functional capabilities) (GENASYS, 2002; Purcell & Grant, 2002; Reed, 2001). However, there is neither a prescriptive nor a universally applicable set of assistive technology devices that can be blindly relied upon when assessing students' needs in this area.

Rather, the need for assistive technology is considered is determined on a case-by-case basis. Assessments may also be requested through the IEP process. IEPs that include assistive technology should be written so that students have access to these accommodations not only for in-class work, but also for projects and all types of tests, including high-stakes assessment. To support the need for assistive technology, parents and professionals must document precisely



how the student benefits educationally. For instance, documentation could include information such as: “Jennifer usually takes 1 hour to do 8 long division math problems. With a voice output [talking] calculator, she can do the same number of problems in 20 minutes” (Purcell & Grant, 2002). When selecting assistive technology devices for an individual, careful analysis must be conducted in determining the appropriateness of the device. Such responsible reviewing should include the following:

- 1) consideration of the individual’s specific strengths, limitations, special abilities, prior experience/knowledge, and interests;
  - 2) compatibility with the specific tasks/functions to be performed (e.g., communicating, computing, assessment);
  - 3) adaptability to specific, varying contexts of interaction (e.g., school-to-home);  
and
  - 4) reliability and quality of technical support offered for the specific device(s).
- (adapted and modified from Edyburn, 2000)

Individuals with disabilities often have difficulty with tasks, such as reading, listening, organizing information or writing, that others consider basic and take for granted. When determining the need and devices necessary, foremost in educators’ minds should be the question, “How can assistive technology increase this student’s academic and daily independence?”

### **Securing Assistive Technology**

The cost of assistive technology devices varies tremendously, ranging from as little as a few dollars for low-tech devices to upwards of \$3,000 for certain high-tech devices such as an

optical character recognition system. While the Rehabilitation Act of 1973 required postsecondary schools to provide, but not necessarily purchase, assistive technology for students with disabilities, the Rehabilitation Act and the Americans with Disabilities Act 1990 (Public law 101-226) is a landmark civil rights legislation which expands the scope of coverage an agency mandates to provide accessible transportation systems, building and programs and communication systems for individual with disabilities. This law introduced the concept of reasonable accommodation, which outlines that employers have a legal obligation to provide “reasonable accommodations,” which includes assistive technology, to its employees with disabilities. In terms of offering assistive technology to students with diagnosed disabilities as well as to those with acknowledged performance problems, the Individuals with Disabilities Education Act (IDEA) requires public schools provide assistive technology if an “education[al] professional” deems it is necessary and the technology is written into the student’s Individualized Education Program . Consequently, once a need has been formally assessed by the relevant general and special educators, the appropriate assistive device *must* be provided by the surrounding public school district without undue consideration of cost. It remains the responsibility of educators to function as advocates for their students and assert their legal rights in this domain.

### **Effective Strategies to Integrate Assistive Technology in Classroom Practices**

Assistive technology skills are not as effective in isolation as they are when these skills and the opportunities to utilize those skills are embedded into daily classroom practices. Assistive technology helps students with disabilities gain access to the general education curriculum and their classroom/school environment. In order for students to make smooth transitions from functioning without assistive technology to developing the incipient skills needed to use their assistive technology device(s) effectively, the teacher must ensure the student has the necessary prerequisite skills. As curricula are not general in nature, and special

education requires individualization in instruction, Universal Design for Learning (UDL), a concept that originated in the field of architecture, is quickly being embraced within the learning environment. Defined as “the design of instructional materials and activities that allow the learning goals to be achievable by individuals with wide differences in their abilities to see, hear, speak, move, read, write, and understand English, attend, organize, engage, and remember” (Orkwis and McLane, 1998: 9), Universal Design for Learning modifies how the curriculum is presented, thereby affecting students’ response to the curriculum. Examples of Universal Design for Learning include digital talking book formats, advance organizers and various types of video output or input (Wehmeyer, 2006). Universal Design accomplishes the individualization in instruction that students receiving special education services require. With the increased focus on inclusive classrooms, teacher accountability, student outcomes, and student access to the curriculum (Schleef, 2003), Universal Design for Learning can be the foundation of achieving that equal access.

Below are a series of user-friendly recommendations to assist general educators seeking to embed these particular sorts of assistive technology standard classroom practices:

- 1) **Training.** Once the classroom teacher has evaluated the need a student has for assistive technology and made the selection for the device, s/he must secure proper ongoing training. To ensure a smooth transition from not having assistive technology to high accessibility to the technology, the teacher in the classroom must receive ample training and have complete confidence in their knowledge of the technology and their ability to train the student in its proper use. Companies that sell the technology will often provide on-site training upon request.
- 2) **Keep the equipment visible and easily accessible.** Refrain from packing the equipment away in a box after training. Even if the student with the disability no longer needs the equipment, allowing it remains visible to all the students in the class

increases technological awareness, exposure, as well as the likelihood that typically developing students will readily accept and embrace the technology.

- 3) **Develop a student-centered plan for ongoing use of the device.** Collaborate with all who work with the student(s) who uses the technology and develop an integrated plan across classes or disciplines that will support the use of the technology that supplements and extends beyond the initial delineations of the original IEP. Teachers planning together will often brainstorm more effective ways to implement to technology to further benefit the student(s) interdisciplinarily.
- 4) **Technical Support.** Maintaining equipment in optimum working order is a must. Make sure that the equipment has a quality check each semester of the school year or annually, at a minimum. Prior to purchase, review the technology company's policy on technical support and repairs, take advantage of each scheduled routine maintenance opportunity, and purchase optional extended warranty and repair plans.
- 5) **Create a Home/School Partnership.** Make sure the parents are aware that the requested technology has arrived and that it has been embedded into their child's curriculum. With this partnership, encourage parents to discuss the daily uses of the technology so their child will see the value-added element it provides in their academic success. Highlight for parents that assistive technology use in the general education environment will ultimately increase their child's independent participation in home, school and community settings.
- 6) **Get the Typically Developing Peers Involved.** With discretion, have the student with a disability demonstrate the assistive technology to the class, allowing the typically developing students to use the device during the demonstration. This demonstration will get the peers involved and onboard with this "cool" piece of

equipment, which will encourage the student with a disability to continue its use, especially since the device is so well accepted among his/her peers, and establish the student with a disability as a functional, authoritative member of the class.

- 7) **Stay Current with Assistive Technology.** Stay abreast of all the current research-based best practices in assistive technology. Subscriptions to relevant journals in the field will help broaden skills and identify the new-improved pieces of assistive technology that will help the child continue to retain equal access to the general education curriculum independently, in accordance with the spirit and mandates of IDEA.
- 8) **Collaborate with your Colleagues.** Team-up with colleagues and invite them to a classroom room where assistive technology has been successfully implemented in order to view the technology at work in its intended functional capacity. No Child Left Behind recognizes the use of technology and its integration throughout the curriculum. This exposure of the devices among other general educator colleagues will increase their awareness, understanding, level of comfort with and support of the technology.
- 9) **Use the technology across multiple settings.** Although you may not be the teacher who identified the need and made the initial purchase of the device, encourage the student who uses the device to take their technology to all classes in the school environment so this will maintain and increase their continuity in learning and the student's skills of generalization.
- 10) **Get EXCITED about Assistive Technology!** Show enthusiasm about assistive technology so that students will be convinced of the infinite positive possibilities and

options assistive technology can bring to people with disabilities as well as those who are typically abled and developing.

Assistive technology is a field in a constant state of development. Assistive technology devices and Universal Design for Learning, in particular, create state-of the-art, user-friendly environment in which children with disabilities are guaranteed equal access to general education curricula through the sustained, substantive use assistive technology devices embedded in that curricula. Classroom teachers, paraprofessional, administrators, parents and students must acknowledge and collaboratively develop feasible plans to infuse these technologies into their curricula. Currently, public school systems, The Individuals with Disabilities Education Act (2004), No Child Left Behind Legislation as well as national and state educational standards reform support, encourage and even require the integration of technology into the general education curriculum. The teacher, however, is the catalyst for transforming these ideals and mandates into actual pedagogical practices. A seamless transition from a device-deficient classroom to successful implementation and continuous use of assistive technology devices which optimize student learning and are compliant with federal guidelines can be accomplished by implementing the recommendations detailed above, one student at a time.

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